

## ABSTRACT

The invention relates to a process for sulfurization of workpiece in vacuum, including cleaning the surface of workpieces, loading the workpieces into vacuum chamber, vacuum pumping, heating the sulfur source for sublimating thereof, making the gaseous sulfur ionized in the presence of a high electrical field and sulfurizing the workpieces, removing the workpieces from the vacuum chamber, wherein after the workpieces being cleaned, putting them into the vacuum chamber that has a pressure-rising rate up to  $10^{-3}$  Pa/h and a ultimate vacuum up to 0.1 Pa, vacuuming to 20 to 100 Pa; heating the workpieces placed on the cathode plate at 35 to 120 °C for 20 to 40 min while keeping a vacuity of 0.1 to 1 Pa for desorbing the substances adsorbed on the surface of the workpieces to make the surface activated; in a direct current electric field of 800 to 1000 V, while keeping the same temperature as above-mentioned ionizing the gaseous sulfur into positive sulfur ions and forming sulfur plasma; directly effecting sulfurization for 1 to 30 min; and finally charging a inert or reductive gas into the vacuum chamber to cool the workpieces and then removing the workpieces from the chamber. The processing parameters of the said process are milder than those in the prior art, and by using said process energy-consumption and treatment-time can be reduced, thereby the production efficiency can be improved. In addition, the uniformity and quality of the surface treatment are improved, and rate of spoiled products due to electric shock is greatly reduced, that is especially of great advantage to the treatment for precise workpieces.

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